

COURSE CATALOGUE & SYLLABUS

FOR

M.Sc. (AGROFORESTRY)



SCHOOL OF FORESTRY & ENVIRONMENT
SHIATS - DEEMED UNIVERSITY,
ALLAHABAD - 211007
UTTAR PRADESH

M.Sc. AGROFORESTRY

Major courses (Minimum 10 Credits)

Course Code	Title	Credits
AGF 601	Principles and Practices of Agroforestry	3(2+1)
AGF 602	Principles of Crop Production in Agroforestry	3(2+1)
AGF 603	Multipurpose Trees in Agroforestry	3(2+1)
AGF 604	Fruit Crops in Agroforestry	3(2+1)
AGF 605	Fodder and Pasture Development in Agroforestry	2(2+0)
AGF 606	Soil and Water Management in Agroforestry	3(2+1)
AGF 607	Economics of Agroforestry Systems	3(2+1)
	Total Credits	10

Minor / Specialization / Optional courses (Minimum 10 Credits)

Course Code	Title	Credits
AGF 608	Silvics and Measurement of Agroforestry Trees	3(2+1)
AGF 609	Insect-Pest Management in Agroforestry	3(2+1)
AGF 610	Disease Management in Agroforestry	3(2+1)
AGF 611	Cultivation of Medicinal and Aromatic Plants in Agroforestry	3(2+1)
AGF 612	Plantation Technology	3(2+1)
AGF 613	Social Forestry	2(2+0)
	Total	17

Supporting courses (Minimum 5 Credits)

Course Code	Title	Credit
MAS 714	Statistics – 1	3(2+1)
MAS 715	Statistics – II (Regression, Correlation)	3(2+1)
COMP 609	Computer Orientation	3(2+1)
	Total	7

Seminar & Research

FOR-980	Seminar I	0+1
FOR-981	Seminar II	0+1
FOR-982	Seminar III	0+1
FOR-999	Research	0+ 45

AGF 601 PRINCIPLES AND PRACTICES OF AGROFORESTRY Cr. 3(2+1)

Theory

Agroforestry - definition, objectives, importance, potential and impediments in implementation - Land capability classification and land use - Overview of global agroforestry systems – Shifting cultivation, Taungya system, multiple and mixed cropping, shelterbelts and windbreaks, energy plantations and homestead gardens - Concepts of community forestry and social forestry - linear strip plantations - Wastelands - definitions, extent, characteristics, reclamation of degraded land through agroforestry interventions.

Practical

Survey and analysis of land use systems in the adjoining areas - Design and plan of suitable models for improvement

Theory

Content	Lecture
• Agroforestry - definition, objectives, importance, potential and impediments in implementation	4
• Land capability classification and land use	4
• Overview of global agroforestry systems	2
• Shifting cultivation, Taungya system, multiple and mixed cropping	3
• Shelterbelts and windbreaks	4
• Energy plantations and homestead gardens	4
• Concepts of community forestry and social forestry	4
• Linear strip plantations	2
• Wastelands - definitions, extent, characteristics	4
• Reclamation of degraded land through agroforestry interventions	3

Practical

Content	Lecture
• Survey and analysis of land use systems in the adjoining areas	8
• Design and plan of suitable models for improvement	7

References

1. Abrol, I.P. and Dhuruva Narayana, V.V. 1990. Technologies for wasteland development. by ICAR, New Delhi.
2. Dwivedi, A.P. 1992. Agroforestry principles and practices. Oxford and IBH Publication Co., New Delhi.
3. Huxley, P. 1999. Tropical agroforestry. Blackwell Science, Oxford.
4. Khosla, P.K. and Khurana, D.K. 1987. Agroforestry for rural needs. Vol. 1 and II, ISTS, Solan, H.P.
5. Nair, P.K.R. 1993. An introduction to agroforestry. Kluwer Academic Publishers.
6. Ong, C.K. and Huxley, P.K. 1996. Tree crop interactions – A physiological approach. ICRAF, Kenya.
7. Ramakrishnan, P.S. 1992. Shifting agriculture and sustainable development. Man and biosphere series. The Parthenon Publishing Group.
8. Sen Sarma, P.K. and Jha, L.K. 1993. Agroforestry. Indian Perspectives. Ashish Publishers, Delhi.
9. Singh, R.V. 1978. Fodder trees of India. Natraj Publishers, Dehradun.

AGF 602 PRINCIPLES OF CROP PRODUCTION IN AGROFORESTRY

Cr. 3(2+1)

Theory

Choice of intercrops for different tree species - Sowing and planting in Agroforestry - Planting techniques, planting patterns, crop geometry, nutrient requirements, irrigation scheduling and weed management of field crops - cereals, pulses, oilseeds, fodders, vegetables, medicinal plants and ornamentals compatible for agroforestry - Seed production - Production potentials in multiple cropping in relation to agro climatic conditions - Crop combinations, crop competition interaction in crop mixtures - Allelopathy

Practical

Measurements of crop growth rates - Study of crop-weed association and fertilizer responses in different crops - Quantitative evaluation of multiple and intercropping systems - Preparation and application of herbicides - Field visits

Theory

Content	Lecture
• Choice of intercrops for different tree species	3
• Sowing and planting in Agroforestry	2
• Planting techniques, planting patterns, crop geometry	3
• Nutrient requirements, irrigation scheduling and weed management of field crops	5
• Cereals, pulses, oilseeds, fodders, vegetables, medicinal plants and ornamentals compatible for agroforestry	8
• Seed production	2
• Production potentials in multiple cropping in relation to agro climatic conditions	4
• Crop combinations, crop competition interaction in crop mixtures	4
• Allelopathy	3

Practical

Content	Lecture
• Measurements of crop growth rates	2
• Study of crop-weed association	3
• Fertilizer responses in different crops	3
• Quantitative evaluation of multiple and intercropping systems	3
• Preparation and application of herbicides	3
• Field visits	2

References

1. Allison, F.C. 1973. Soil organic matter and its role in crop production. Elsevier Scientific Publishing Co., Amsterdam.
2. Kononova, M.M. 1966. Soil organic matter. Its role in soil formation and soil fertility. Pergamon Press, Oxford
3. Reddy, M.V. 1995. Soil organisms and litter decomposition in the tropics. Oxford & IBH Publishing Co. P. Ltd.
4. Richard F. Fisher and Dan Binkley. 2000. Ecology and management of forest soils. III ed. John Wiley & Sons, Inc.

5. Stevenson, F.J. 1982. Humus chemistry: genesis, composition, reactions. John Wiley and Sons, New York.
6. Nair, P.K.R. 1993. An introduction to agroforestry. Kluwer Academic Publishers.
7. Ong, C.K. and Huxley, P.K. 1996. Tree crop interactions – A physiological approach. ICRAF, Kenya.
8. Ramakrishnan, P.S. 1992. Shifting agriculture and sustainable development. Man and biosphere series. The Parthenon Publishing Group.
9. Sen Sarma, P.K. and Jha, L.K. 1993. Agroforestry. Indian Perspectives. Ashish Publishers, Delhi.
10. Singh, R.V. 1978. Fodder trees of India. Natraj Publishers, Dehradun.

AGF 603 MULTIPURPOSE TREES IN AGROFORESTRY Cr. 3(2+1)

Theory

Introduction and importance of woody elements in agroforestry systems - Role in biomass production - Suitability of tree species for specific sites - Multipurpose trees in agroforestry systems - Role of nitrogen fixing trees/shrubs - Choice of species for various agroclimatic zones for the production of timber, fodder, fuel wood, fibre, forage, live hedges, alley cropping, wind breaks and green manuring - General and specific characters of various tree species & their propagation techniques - Micro-climatic studies, root behavior, crown architecture including methods for minimizing unfavourable interactions - Production potential of different combinations - Species testing and Provenance trials - Seed certification and storage - Elite trees selection

Practical

Selection of different multipurpose trees for various agroforestry models viz. Agrisilviculture, Agrisilvipasture, Silvipasture, Silviagriculture, Agrisilvihorticulture, Silvihorticulture – Nursery techniques of various multipurpose trees for agroforestry systems - Micro-climatic studies, root behavior studies, crown architecture studies in trees including methods for minimizing unfavourable interactions

Theory

Content	Lecture
• Introduction and importance of woody elements in agroforestry systems	2
• Role in biomass production	2
• Suitability of tree species for specific sites	2
• Multipurpose trees in agroforestry systems	2
• Role of nitrogen fixing trees/shrubs	2
• Choice of species for various agroclimatic zones for the production of timber, fodder	2
• Choice of species for various agroclimatic zones for the production of fuel wood, fibre, forage	3
• Choice of species for various agroclimatic zones for the production of live hedges, alley cropping	3
• Choice of species for various agroclimatic zones for the production of wind breaks and green manuring	3
• General and specific characters of various tree species & their propagation techniques	2
• Micro-climatic studies, root behavior, crown architecture including methods for minimizing unfavourable interactions	3
• Production potential of different combinations	2
• Species testing and Provenance trials	2
• Seed certification and storage	2
• Elite trees selection	2

Practical

Content	Lecture
• Selection of different multipurpose trees for various agroforestry models of Agrisilviculture	2
• Selection of different multipurpose trees for various agroforestry models of Agrisilvipasture	2

- Selection of different multipurpose trees for various agroforestry models of Silvipasture 2
- Selection of different multipurpose trees for various agroforestry models of Silviagriculture 2
- Selection of different multipurpose trees for various agroforestry models of Agrisilvihorticulture 2
- Selection of different multipurpose trees for various agroforestry models of Silvihorticulture 2
- Nursery techniques of various multipurpose trees for agroforestry systems 1
- Micro-climatic studies 1
- Root behavior studies 1
- Crown architecture studies in trees including methods for minimizing unfavourable interactions 2

References

1. Negi, SS. 1999. Agroforestry Handbook
2. Ram Parkash. 1979. Theory & Practices of Silvicultural Systems.
3. Chundawat, BS. And Gautam SK. 1999. Textbook of Agroforestry. Oxford & IBH Publishers Co. Pvt. Ltd New Delhi 2
4. Tejwani, K.G. 1994. Agroforestry in India. Oxford and IBH Publ. Co., New Delhi.
5. Zobel, B.J. and Talbert, J. 1984. Applied Forest Tree Improvement. John Wiley & Sons, New York.

AGF 604 FRUIT CROPS IN AGROFORESTRY**Cr. 3(2+1)****Theory**

Fruit crops – Need and relevance in agro forestry - General features of multipurpose fruit species - Fruit trees suitable for timber, fodder, ornamental, wind breaks, soil & water Conservation - Choice of trees as wind breaks for orchard protection and their interaction with fruit productions - Fruit trees suitable for various assemblages and their planting plans in different agro-climatic situations and agroforestry systems - Modifications in training and pruning, floor and fertility management, yield and quality improvement.

Practical

Field survey and acquaintance with specialized features of fruit species and varieties for agroforestry - Planting plans including wind breaks - Training and pruning methods of fruit crops - Floor and fertility management of fruit crops in agroforestry systems

Theory

Content	Lecture
• Fruit crops – Need and relevance in agro forestry	3
• General features of multipurpose fruit species	4
• Fruit trees suitable for timber	2
• Fruit trees suitable for fodder	2
• Fruit trees suitable for ornamental	2
• Fruit trees suitable for wind breaks	2
• Fruit trees suitable for soil & water Conservation	3
• Choice of trees as wind breaks for orchard protection and their interaction with fruit productions	5
• Fruit trees suitable for various assemblages and their planting plans in different agro-climatic situations and agroforestry systems	5
• Modifications in training and pruning	2
• Floor and fertility management	2
• Yield and quality improvement	2

Practical

Content	Lecture
• Field survey and acquaintance with specialized features of fruit species and varieties for agroforestry	5
• Planting plans including wind breaks	3
• Training and pruning methods of fruit crops	5
• Floor and fertility management of fruit crops in agroforestry systems	4

References

1. Mazumdar, B.C. 2004. Principles and Methods of Orchard Establishment. Daya Publishing House, New Delhi-110035.
2. Mazumdar, B.C. 2004. Orchard Irrigation and Soil Management Practices. Daya Publishing House, New Delhi-110035.
3. Mazumdar, B.C. 2004. Minor Fruit Crops of India (Tropical & Subtropical). Daya Publishing House, New Delhi-110035. Tejwani, K.G. 1994. Agroforestry in India. Oxford and IBH Publ. Co., New Delhi.

4. Chandha, T.R. 2005. Textbook of Temperate Fruits. Directorate of Information and Publications of Agriculture, ICAR, New delhi.
5. ICAR, 2000. Handbook of Horticulture. ICAR, New Delhi.

AGF 605. FODDER AND PASTURE DEVELOPMENT IN AGROFORESTRY
Cr. 2(2+0)

Theory

Importance of fodder and pasture development - Fodder resources of India and Uttar Pradesh - Forests as a source of fodder - Grazing and browsing – Lopped tree fodder and species suitable of lopping- Grasses, herbs and shrubs – Carrying capacity and sites calculation - Establishing Pastures in Agroforestry system - Choice of species – Grasses, legumes and tree species suitable for different agroforestry system – use of community lands, degraded lands and private holdings - Cutting and lopping cycle – Regeneration – Soil and water conservation measures - Grazing Systems viz. Rotational grazing – Paddocks – Closure cycle – Cut and carry system – Limiting the number of cattle allowed for grazing - Agro-forestry practices for fodder production - Silvipasture – Agrisilvipasture – Planting of fodder trees on field bunds - Fodder banks in Community lands & Private holdings – Supply of cut fodder and legumes & species suitable - Production technology of important fodder grasses, legumes, shrubs and trees - Nutritive value of important fodders

Theory

Content	Lecture
• Importance of fodder and pasture development	2
• Fodder resources of India and Uttar Pradesh	2
• Forests as a source of fodder	2
• Grazing and browsing	2
• Lopped tree fodder and species suitable of lopping	2
• Grasses, herbs and shrubs	2
• Carrying capacity and sites calculation	2
• Establishing Pastures in Agroforestry system	2
• Choice of species – Grasses, legumes and tree species suitable for different agroforestry system	1
• Use of community lands, degraded lands and private holdings	2
• Cutting and lopping cycle – Regeneration	1
• Soil and water conservation measures	1
• Grazing Systems viz. Rotational grazing – Paddocks – Closure cycle – Cut and carry system	3
• Limiting the number of cattle allowed for grazing	1
• Agro-forestry practices for fodder production - Silvipasture	1
• Agro-forestry practices for fodder production– Agrisilvipasture	2
• Planting of fodder trees on field bunds	2
• Fodder banks in Community lands & Private holdings	1
• Supply of cut fodder and legumes & species suitable	1
• Production technology of important fodder grasses, legumes, shrubs and trees	1
• Nutritive value of important fodders	1

References

1. Voision, A. 1995. Grass productivity. Crosby Lockwood & sons Ltd. London.
2. Kerman, P.J. and Riveros, F. 1990. Tropical Grasses. FAO. United Nations Rome.

3. Kundu, S.S., Singh S, Mahanta, S.K., Pailan, G.H. 2005. Feeding Farm Animals. Satish Serial Publishing House. Delhi 110033.
4. Prasad, J. and Neeraj. 2008. Principles and Practices of Animal Nutrition. Kalyani Publishers, New Delhi.

AGF 606 SOIL AND WATER MANAGEMENT IN AGROFORESTRY Cr. 3(2+1)

Theory

Soil and water management - objectives and scope in relation to agroforestry systems - Soil and water conservation - Land classification and carrying capacity in different agro ecosystems - Irrigation potential and methods - Concepts in integrated watershed management - Optimization of water use in agroforestry systems and dry land farming - Interpretation of agrometeorological data for water management - Problem soils and their management - Soil organisms and nitrogen fixation - Biogeochemical cycling of nutrients including organic matter decomposition - Nutrient budgeting and soil productivity under different agro-ecosystems.

Practical

Calculation of water storage and fluxes in the soil - Determination of in situ infiltration rate of soils - Measurement and estimation of run off - Analysis of soil and plant samples for NPK - Study of biogeochemical cycle in agroforestry systems

Theory

Content	Lecture
• Soil and water management	2
• objectives and scope in relation to agroforestry systems	2
• Soil and water conservation	2
• Land classification and carrying capacity in different agro ecosystems	3
• Irrigation potential and methods	3
• Concepts in integrated watershed management	3
• Optimization of water use in agroforestry systems and dry land farming	3
• Interpretation of agrometeorological data for water management	3
• Problem soils and their management	3
• Soil organisms and nitrogen fixation	3
• Biogeochemical cycling of nutrients including organic matter decomposition	3
• Nutrient budgeting and soil productivity under different agro-ecosystems	3

Practical

Content	Lecture
• Calculation of water storage and fluxes in the soil	3
• Determination of in situ infiltration rate of soils	3
• Measurement and estimation of run off	3
• Analysis of soil and plant samples for NPK	5
• Study of biogeochemical cycle in agroforestry systems	3

References

1. Siyag, R.P. 1998. The Agroforestry Manual, Technology and Management. Published by Hema Siyag, Jhotwara, Jaipur 302012.
2. Stepanov, A.M. 1993. Agroforestry in Irrigated Lands. MD Publication Pvt. Ltd, New Delhi 110002.
3. Tiwari, D.N.1993. Agroforestry. IBD, Dehradun 248001.
4. Negi, S.S. 1993. Agroforestry Handbook. IBD, Dehradun 248001.

AGF 607 ECONOMICS OF AGROFORESTRY SYSTEMS Cr. 3(2+1)

Theory

Basic principles of economics applied to agroforestry - Optimization techniques – Planning, budgeting and functional analysis - Role of time, risk and uncertainty in decision making - Financial and socio-economic analysis of agroforestry projects - Principles of financial management, harvesting, postharvest handling, marketing of agroforestry products including benefit sharing.

Practical

Exercises on agroforestry production relationships - Preparation of enterprise, partial and complete budgets - Application of various methods in formulation and appraisal of agroforestry projects - Case studies on harvesting, postharvest management and marketing of agroforestry products

Theory

Content	Lecture
• Basic principles of economics applied to agroforestry	4
• Optimization techniques	3
• Planning, budgeting and functional analysis	4
• Role of time, risk and uncertainty in decision making	5
• Financial and socio-economic analysis of agroforestry projects	5
• Principles of financial management, harvesting	4
• Postharvest handling	3
• Marketing of agroforestry products including benefit sharing	5

Practical

Content	Lecture
• Exercises on agroforestry production relationships	3
• Preparation of enterprise	2
• Partial and complete budgets	3
• Application of various methods in formulation and appraisal of agroforestry projects	4
• Case studies on harvesting, postharvest management and marketing of agroforestry products	5

References

1. Reddy, S.S. Raghuram, P. and Sastry, T.V.N, 2000. Agricultural Economics. Oxford & IBD Publishing Co. Pvt. Ltd. New Delhi.
2. Reddy, S.S. and Raghuram, P., 2001. Agricultural Finance & Management. Oxford & IBD Publishing Co. Pvt. Ltd. New Delhi.
3. Wadu, L.K. and Murthy, C., 2000. Agricultural Marketing and Cooperation. ICAR Directorate of Information & Publications. New Delhi.
4. Acharga, S.S. and Agarwal, N.L., 2001. Agricultural Marketing in India. Oxford & IBD Publishing Co. Pvt. Ltd. New Delhi.

BASIC SUPPORTING COURSES

MAS 714 STATISTICS – 1 Cr. 3(2+1)

Theory

Analysis of variance: Definition and assumptions, one way classification, two way classification. Sampling Techniques: Simple random sampling, stratified random sampling, systematic sampling. Design Experiments: Randomized Block design, Latin Square design, Factorial design (2^2 , 2^3 , 3^2 , 3^3 factorials), Some P x Q experiments, Split Plot Experiments. Balanced Incomplete Block design

Practical

Analysis of variance, Randomized Block Design.

Theory

Content	Lecture
• Analysis of variance	2
• Definition and assumptions,	2
• one way classification,	2
• two way classification.	2
• Sampling Techniques	2
• Simple random sampling	2
• stratified random sampling	2
• systematic sampling.	2
• Design Experiments	2
• Randomized Block design	2
• Latin Square design	2
• Factorial design (2^2 , 2^3 , 3^2 , 3^3 factorials)	3
• Some P x Q experiments	3
• Split Plot Experiments	3
• Balanced Incomplete Block design	3

Practical

Content	Lecture
• Analysis of variance	6
• Randomized Block Design	11

References

1. Bernard Ostle and R.W.Mensing, Statistics in Research.
2. C.H. Goulden, Method of Statistical Analysis.
3. G.W. Snedecor and W.G. Cochran, Statistical Methods.
4. R.G. Steel and J.H. Torrie, Principles and Procedures of Statistics (with special reference to Biological Sciences)
5. R.Rangaswamy, A Text Book of Agricultural Statistics.
6. Chandel S.R.S, A Text Book of Agricultural Statistics.
7. W.G. Cochran and G.M.Cox, Experimental Designs.

Theory

Statistical Methods: Measures of Skewness and Kurtosis, standard error of mean, Coefficient of variation. Theory of Probability : Definitions, Additions and Multiplication rules of Probability, Conditional Probability. Probability distributions: Normal, Binomial and Poisson distributions. Correlation and Regression : Simple correlation, Rank correlation, Regression Coefficient, Multiple and Partial Correlation, Regression lines between two variables, Multiple Regression. Tests of Significance: X^2 - test, t - test one sample, two sample t – tests, paired t-test, F – test, Fisher’s 2 – transformation

Practical

Coefficient of variation, SE of mean, Skewness and Kurtosis. Fitting of Normal, Binomial and Poisson distribution. Simple Correlation, Multiple and Partial Correlation with three variables only. Regression lines between two variables. X^2 , t and F – tests

Theory

Content	Lecture
• Statistical Methods: Measures of Skewness and Kurtosis	2
• standard error of mean	2
• Coefficient of variation	2
• Theory of Probability : Definitions	2
• Additions and Multiplication rules of Probability	2
• Conditional Probability	2
• Probability distributions: Normal, Binomial and Poisson distributions	2
• Correlation and Regression : Simple correlation	2
• Rank correlation	2
• Regression Coefficient	2
• Multiple and Partial Correlation	3
• Regression lines between two variables	3
• Multiple Regression	3
• Tests of Significance: X^2 - test	3
• t - test one sample	2
• two sample t – tests	2
• paired t-test, F – test	2
• Fisher’s 2 – transformation	2

Practical

Content	Lecture
• Coefficient of variation	2
• SE of mean	1
• Skewness and Kurtosis	2
• Fitting of Normal	2
• Binomial and Poisson distribution	2

- Simple Correlation 2
- Multiple and Partial Correlation with three variables only 2
- Regression lines between two variables 2
- X^2 , t and F – tests 2

Reference

1. C.H. Goulden, Method of Statistical Analysis.
2. Bernard Ostle and R.W.Mensing, Statistics in Research.
3. R.Rangaswamy, A Text Book of Agricultural Statistics.
4. Chandel S.R.S, A Text Book of Agricultural Statistics.
5. W.G. Cochran and G.M.Cox, Experimental Designs.

COMP 609 COMPUTER ORIENTATION Cr. 3(2+1)

Theory

Introduction to multi programming and time sharing computers - Login and creation of files - Introduction to structured programming with reference to BASIC - Variables and constants, complex, double precision, logical, character - Arithmetic expressions, arrays, control statements (DO, IF, Computed GOTO) - Functions and subroutines - I/O statements - Elementary programming of algorithms.

Practical

Loading Windows and other features in Windows. MS Word – creation, editing of a document. Using features like underlining, bold, italics, spell check etc. and printing. Creation of excel sheet and processing for statistical analysis. Creation of a database in access - Mstat – creation of a data file. Internet – getting connected and email Internet – retrieval of information.

Theory

Content	Lecture
• Introduction to multi programming and time sharing computers	3
• Login and creation of files	3
• Introduction to structured programming with reference to BASIC	4
• Variables and constants	3
• Complex, double precision	3
• Logical, character	3
• Arithmetic expressions	3
• Arrays, control statements (DO, IF, Computed GOTO)	4
• Functions and subroutines - I/O statements	4
• Elementary programming of algorithms	4

Practical

Content	Lecture
• Loading Windows and other features in Windows	3
• MS Word – creation, editing of a document	2
• Using features like underlining, bold, italics, spell check etc. and printing	3
• Creation of excel sheet and processing for statistical analysis	2
• Creation of a database in access - Mstat – creation of a data file	3
• Internet – getting connected and email Internet – retrieval of information	3

References

1. Chris Lewis, Essential Tips: Using the Internet
2. Gene Weisskopf, ABCs of Excel 97
3. Kenneth N.Berk, Introductory Statistics with Systat
4. Kris N, Advanced Data Analysis with Systat
5. Mark Wallace, Things to do on the Internet
6. Ron Mansfield, The Compact Guide to Microsoft Office

SPECIALIZATION COURSES

AGF 608 SILVICS AND MEASUREMENT OF AGROFORESTRY TREES

Cr. 3(2+1)

Theory

Studies pertaining to distribution, phonology, growth behaviour, autecology, Synecology, community, environment and regeneration techniques of the following agroforestry tree species - *Acacia* spp., *Terminalia* spp., *Tectona grandis*, *Grewia optiva*, *Morus alba*, *Bauhinia variegata*, *Albizia* spp., *Populus* spp., *Eucalyptus* spp., *Gmelina arborea*, *Dalbergia* spp., - Theory of tree measurement - Instruments and methods for measurement of tree diameter, height, volume, basal area, bark thickness, crown Volume, and crown surface area - Tree stem form - Measurement and computation of volume of standing and felled trees - Estimation of biomass - Determination of tree age

Practical

Measurement of girth, diameter, height, basal area, volume, crown length, crown width, Increment boring - Computation of volume of standing and felled trees

Theory

Content	Lecture
• Studies pertaining to distribution, phonology, growth behaviour, autecology, Synecology, community, environment and regeneration techniques of the following agroforestry tree species - <i>Acacia</i> spp., <i>Terminalia</i> spp	4
• Studies pertaining to distribution, phonology, growth behaviour, autecology, Synecology, community, environment and regeneration techniques of the following agroforestry tree species - <i>Tectona grandis</i> , <i>Grewia optiva</i>	4
• Studies pertaining to distribution, phonology, growth behaviour, autecology, Synecology, community, environment and regeneration techniques of the following agroforestry tree species - <i>Morus alba</i> , <i>Bauhinia variegata</i> ,	4
• Studies pertaining to distribution, phonology, growth behaviour, autecology, Synecology, community, environment and regeneration techniques of the following agroforestry tree species - <i>Albizia</i> spp., <i>Populus</i> spp	4
• Studies pertaining to distribution, phonology, growth behaviour, autecology, Synecology, community, environment and regeneration techniques of the following agroforestry tree species - <i>Eucalyptus</i> spp., <i>Gmelina arborea</i> , <i>Dalbergia</i> spp	6
• Theory of tree measurement	2
• Instruments and methods for measurement of tree diameter, height, volume, basal area, bark thickness, crown Volume, and crown surface area	3
• Tree stem form	1
• Measurement and computation of volume of standing and felled trees -	2
• Estimation of biomass	2
• Determination of tree age	2

Practical

	Content	Lecture
•	Measurement of girth, diameter	3
•	Measurement of height	2
•	Measurement of basal area	2
•	Measurement of volume	2
•	Measurement of crown length, crown width	4
•	Increment boring - Computation of volume of standing	2
•	Computation of volume of felled trees	2

References

1. David M. Smith. 1989. "The Practice of silviculture". EBD Educational Pvt. Ltd. Dehradun, India.
2. Dwivedi, A.P. 1993. A Text Book of Silviculture, International Book Distributors, Dehradun
3. Khanna, L. S. 1984. Principles and Practice of Silviculture, Khanna Bhandu, Dehra Dun.
4. Luna R K.2005. Plantation Trees. International Book Distributors, Dehra Dun.
5. Ram Prakash and L.S. Khanna. 1991. Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun.
6. Ramakrishnan, P.S. 1992. Shifting agriculture and sustainable development. Man and biosphere series. The Parthenon Publishing Group.
7. Sen Sarma, P.K. and Jha, L.K. 1993. Agroforestry. Indian Perspectives. Ashish Publishers, Delhi.
8. Singh, R.V. 1978. Fodder trees of India. Natraj Publishers, Dehradun.
9. Tejwani, K.G. 1994. Agroforestry in India. Oxford and IBH Publ. Co., New Delhi.
10. Young, A. 1997. Agroforestry for soil management. CAB Intl. Wellingford.

AGF 609 INSECT-PEST MANAGEMENT IN AGROFORESTRY

Cr. 3(2+1)

Theory

Insect-pest problems in agroforestry systems - Basic principles and practices of integrated pest management in agroforestry ecosystems with emphasis on cultural practices, chemical, biological and other non-chemical methods.

Practical

Identification and familiarization with important insects & pests of agroforestry systems - Handling and use of insecticides and application equipments – Collection of 25 specimens of insect-pests of agroforestry systems

Theory

Content	Lecture
• Insect-pest problems in agroforestry systems	6
• Basic principles and practices of integrated pest management in agroforestry ecosystems with emphasis on cultural practices	7
• Basic principles and practices of integrated pest management in agroforestry ecosystems with emphasis on chemical	7
• Basic principles and practices of integrated pest management in agroforestry ecosystems with emphasis on biological	7
• Basic principles and practices of integrated pest management in agroforestry ecosystems with emphasis on other non-chemical methods	7

Practical

Content	Lecture
• Identification and familiarization with important insects & pests of agroforestry systems	5
• Handling and use of insecticides and application equipments	5
• Collection of 25 specimens of insect-pests of agroforestry systems	7

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AGF 610 DISEASE MANAGEMENT IN AGROFORESTRY Cr. 3(2+1)

Theory

Disease Management in Agroforestry models - Important diseases of trees and crops in agroforestry systems - Interaction of crops and trees in relation to disease problems - Principles and practices of integrated disease management with emphasis on cultural practices, use of chemicals, regulatory measures, biological and other non-chemical innovative methods

Practical

Identification and familiarization of important diseases of agroforestry trees and crops - Field testing of fungicides and bio-control agents - Handling and use of fungicide application & equipments – Collection of 25 disease specimens in agroforestry systems.

Theory

Content	Lecture
• Disease Management in Agroforestry models	2
• Important diseases of trees and crops in agroforestry systems	5
• Interaction of crops and trees in relation to disease problems	2
• Principles and practices of integrated disease management with emphasis on cultural practices	5
• Principles and practices of integrated disease management with emphasis on use of chemicals	3
• Principles and practices of integrated disease management with emphasis on regulatory measures	5
• Principles and practices of integrated disease management with emphasis on biological	5
• Principles and practices of integrated disease management with emphasis on other non-chemical innovative methods	6

Practical

Content	Lecture
• Identification and familiarization of important diseases of agroforestry trees and crops	5
• Field testing of fungicides and bio-control agents	3
• Handling and use of fungicide application & equipments	2
• Collection of 25 disease specimens in agroforestry systems.	7

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AGF 611 CULTIVATION OF MEDICINAL AND AROMATIC PLANTS IN AGROFORESTRY

Cr. 3(2+1)

Theory

Studies on botanical features of important species of Aconitum, Artomisia, Atropa, Papaver, Adhatoda, Berberis, Cannabis, Dioscorea, Digitalis, Ephedra, Fagopyrum, Hyoscyamus, Jurinea, Mentha, Ocimum, Podophyllum, Rauvolfia, Rheum, Salvia, Saussurea, Solanum, Viola, Aloe, Chlorophytum, Andrographis and Withania - Physiological factors affecting action and toxicity of medicinal plants - Cultivation and marketing of important medicinal plants- Cultivation of Medicinal and aromatic plants under Agroforestry systems

Practical

Identification of medicinal and aromatic plants and their seeds - Nursery technology - Planting methods and cultural practices of important medicinal and aromatic plants- Medicinal & Aromatic plants Agroforestry systems

Theory

Content	Lecture
• Studies on botanical features of important species of Aconitum, Artomisia	2
• Studies on botanical features of important species of Atropa, Papaver	2
• Studies on botanical features of important species of Adhatoda, Berberis	2
• Studies on botanical features of important species of Cannabis, Dioscorea	2
• Studies on botanical features of important species of Digitalis, Ephedra	2
• Studies on botanical features of important species of Fagopyrum, Hyoscyamus	2
• Studies on botanical features of important species of Jurinea, Mentha,	2
• Studies on botanical features of important species of Ocimum, Podophyllum	2
• Studies on botanical features of important species of Rauvolfia, Rheum	2
• Studies on botanical features of important species of Salvia, Saussurea	2
• Studies on botanical features of important species of Solanum, Viola	2
• Studies on botanical features of important species of Aloe, Chlorophytum	2
• Studies on botanical features of important species of Andrographis and Withania	2
• Physiological factors affecting action and toxicity of medicinal plants	3
• Cultivation and marketing of important medicinal plants	2
• Cultivation of Medicinal and aromatic plants under Agroforestry systems	3

Practical

Content	Lecture
• Identification of medicinal and aromatic plants and their seeds	4
• Nursery technology	3
• Planting methods and cultural practices of important medicinal and aromatic plants	4
• Medicinal & Aromatic plants Agroforestry systems	6

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Theory

SEEDS: Seed collection and extraction – Cleaning and grading – Seed testing for germinative capacity and vigour – Dormancy and after ripening - Pre-treatment of seeds – Weathering, mechanical treatment, fire treatment, water treatment, scarification, chemical treatment, fermentation, passage through animals. **VEGETATIVE PROPAGATION:** Cuttings, stumps (root – shoot cuttings), grafting, budding, root suckers, bulbs. **NURSERIES:** Location, site preparation, layout, water supply, shading, formation sowing of beds, watering, plant protection, culling and grading. **CONTAINERS:** Polythene bags, mudpots, hycopots, root trainers. **PLANTATION PRACTICES:** Site preparation – clearing, stump removal, burning - Soil preparation – ploughing, hoeing, patch working, ridges and trenches, mounds, pits – aligning and staking - Season of planting / sowing - Direct sowing - broadcast sowing, dibbling, strip and line sowing, patch sowing, ridge and mound sowing - Planting – pit planting, ridge planting, mound planting - Spacing for different species - Replacing casualties - Weeding and soil working - Fertilizer application - Inter cropping / cover cropping - Pruning – Thinning - Soil and water conservation measures - Drainage.

Practical

Field visits to plantations of different species and study:

- a) Preliminary field operations
- b) Aligning and stacking
- c) Pitting
- d) Planting
- e) Weeding and soil working
- f) Cultural operations
- g) Tending and thinning

Theory

Content	Lecture
• Seeds : Seed collection and extraction	2
• Cleaning and grading	2
• Seed testing for germinative capacity and vigour	2
• Dormancy and after ripening - Pre-treatment of seeds –measures - Drainage.	2
• Weathering, mechanical treatment, fire treatment, water treatment, scarification, chemical treatment, fermentation, passage through animals	3
• Vegetative Propagation: Cuttings, stumps (root – shoot cuttings), grafting, budding, root suckers, bulbs	3
• Nurseries : Location, site preparation, layout, water supply, shading, formation sowing of beds, watering, plant protection, culling and grading	3
• Containers : Polythene bags, mudpots, hycopots, root trainers	2
• Plantation practices : Site preparation – clearing, stump removal, burning	2
• Soil preparation – ploughing, hoeing, patch working, ridges and trenches, mounds, pits – aligning and staking	3
• Season of planting / sowing - Direct sowing - broadcast sowing, dibbling, strip and line sowing, patch sowing, ridge and mound sowing	3
• Planting – pit planting, ridge planting, mound planting - Spacing for	2

- different species
- Replacing casualties - Weeding and soil working - Fertilizer application 2
- Inter cropping / cover cropping – Pruning – Thinning - Soil and water conservation 3

Practical

Content	Lecture
• Field visits to plantations of different species and study -Preliminary field operations	3
• Aligning and stacking	2
• Pitting	2
• Planting	2
• Weeding and soil working	3
• Cultural operations	2
• Tending and thinning	3

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AGF 613 SOCIAL FORESTRY Cr. 2(2+0)**Theory**

Social forestry – Definitions - Evolution of Social Forestry Programme in India - National Forest Policy – Creation of woodlots outside existing forests – Vanamahotesave – Launching of Farm Forestry Programme in third five year plan – Tamil Nadu’s role as trend setter – Role of Punjab, Gujarat, Karnataka and Haryana – International Aid agencies – SIDA, CIDA, World Bank, USAID - Need for Social Forestry - Depletion and area constraint of government forests – Abundance of community wastelands – Improved land resource utilization – Environmental upgradation – Augmenting forest products availability – Rural employment and poverty alleviation - Constraints on Tree Growing - Objectives of social Forestry - Components of Social Forestry - Community forestry – Farm forestry – Extension forestry – Recreation forestry – Urban forestry – Interface forestry - Components as envisaged in the National Programme – Plantations on Government lands – Reforestation of degraded forests - People’s Participation - Evolution – Social forestry committees – Consultation on choice of species, raising and protection – Benefit sharing – Various models of benefit sharing

Theory

Content	Lecture
• Social forestry – Definitions - Evolution of Social Forestry	2
• Programme in India - National Forest Policy – Creation of woodlots outside existing forests	3
• Vanamahotesave – Launching of Farm Forestry	2
• Programme in third five year plan – Tamil Nadu’s role as trend setter –	2
• Programme in third five year plan - Punjab, Gujarat, Karnataka and Haryana	2
• International Aid agencies – SIDA, CIDA, World Bank, USAID -	2
• Need for Social Forestry - Depletion and area constraint of government forests	2
• Abundance of community wastelands – Improved land resource utilization	2
• Environmental upgradation	1
• Augmenting forest products availability	1
• Rural employment and poverty alleviation	2
• Constraints on Tree Growing	1
• Objectives of social Forestry	1
• Components of Social Forestry	1
• Community forestry – Farm forestry	1
• Extension forestry – Recreation forestry	1
• Urban forestry – Interface forestry	1
• Components as envisaged in the National Programme	1
• Plantations on Government lands	1
• Reforestation of degraded forests	1
• People’s Participation	1
• Evolution – Social forestry committees	1
• Consultation on choice of species, raising and protection	1
• Benefit sharing – Various models of benefit sharing	1

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